IN THE CLAIMS

1. (currently amended) An injection molding apparatus for forming articles having a hole, comprising:

at least one mold cavity formed between a cavity plate and an adjacent core;

at least one injection molding nozzle having a melt channel and an annular gate, said at least one injection molding nozzle connectable to a source of molten material and capable of feeding molten material from said source to said at least one mold cavity through said melt channel and said annular gate, ~~through at least one melt channel through said nozzle, said gate communicating with said at least one mold cavity, said gate having a cross-section that is wider than the cross-section of said melt channel~~; and

a valve pin disposed ~~interior of~~ within said melt channel and ~~said gate, said valve pin~~ defining an unrestricted melt flow passage through said ~~melt channel~~ nozzle around and along said valve pin, said valve pin moveable between a closed position in which a head portion of said valve pin substantially contacts said gate sufficiently to stop the flow of molten material through said gate, and an open position in which molten material can flow unrestricted to said gate,

wherein the cross-section of the gate is wider than the cross-section of the melt channel through said nozzle.

2. (original) Apparatus according to claim 1, wherein said core includes a core sleeve for engaging said valve pin.

3. (original) Apparatus according to claim 2, wherein said core sleeve engages the perimeter of said valve pin.

4. (currently amended) Apparatus according to claim 3, wherein the head portion of said valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding said valve pin between said closed position and said open position.

5. (currently amended) Apparatus according to claim 1, wherein the head portion of said valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding said valve pin between said closed position and said open position.

6. (original) Apparatus according to claim 5, wherein said gate cross-section is substantially circular.

7. (original) Apparatus according to claim 5, wherein said gate cross-section is substantially oval.

8. (original) Apparatus according to claim 5, wherein said gate cross-section is substantially square.

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9. (original) Apparatus according to claim 5, wherein said gate cross-section is substantially rectangular.

10. (original) Apparatus according to claim 5, wherein said gate cross-section is irregular.

11. (original) Apparatus according to claim 1, wherein said gate cross-section is substantially circular.

12. (original) Apparatus according to claim 1, wherein said gate cross-section is substantially oval.

13. (original) Apparatus according to claim 1, wherein said gate cross-section is substantially square.

14. (original) Apparatus according to claim 1, wherein said gate cross-section is substantially rectangular.

15. (original) Apparatus according to claim 1, wherein said gate cross-section is irregular.

16. (original) Apparatus according to claim 1, wherein said at least one nozzle includes a nozzle tip which is separable from said at least one nozzle, said gate being located in said nozzle tip.

17. (currently amended) An injection molding apparatus for forming articles having a hole, comprising:

at least one mold cavity formed between a cavity plate and an adjacent core;

at least one injection molding nozzle having a melt channel and an annular gate, said at least one injection molding nozzle connectable to a source of molten material and capable of feeding molten material from said source to said at least one mold cavity through said melt channel and said annular gate, ~~through at least one melt channel through said nozzle, said gate communicating with said at least one mold cavity, said gate having a cross-section that is wider than the cross-section of said melt channel~~; and

a valve pin disposed ~~interior of~~ within said melt channel and ~~said gate, said valve pin~~ defining an unobstructed melt flow passage through said ~~melt channel~~ nozzle around and along said valve pin, said valve pin moveable between a closed position in which a head portion of said valve pin substantially contacts said gate sufficiently to stop the flow of molten material through said gate, and an open position in which molten material can flow unrestricted to said gate,

wherein the cross-section of the gate is wider than the cross-section of the melt channel through said nozzle.

18. (original) Apparatus according to claim 17, wherein said core includes a core sleeve for engaging said valve pin.

19. (original) Apparatus according to claim 18, wherein said core sleeve engages the perimeter of said valve pin.

20. (currently amended) Apparatus according to claim 19, wherein the head portion of said valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding said valve pin between said closed position and said open position.

21. (currently amended) Apparatus according to claim 17, wherein the head portion of said valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding said valve pin between said closed position and said open position.

22. (original) Apparatus according to claim 21, wherein said gate cross-section is substantially circular.

23. (original) Apparatus according to claim 21, wherein said gate cross-section is substantially oval.

24. (original) Apparatus according to claim 21, wherein said gate cross-section is substantially square.

25. (original) Apparatus according to claim 21, wherein said gate cross-section is substantially rectangular.

26. (original) Apparatus according to claim 21, wherein said gate cross-section is irregular.

27. (original) Apparatus according to claim 17, wherein said gate cross-section is substantially circular.

28. (original) Apparatus according to claim 17, wherein said gate cross-section is substantially oval.

29. (original) Apparatus according to claim 17, wherein said gate cross-section is substantially square.

30. (original) Apparatus according to claim 17, wherein said gate cross-section is substantially rectangular.

31. (original) Apparatus according to claim 17, wherein said gate cross-section is irregular.

32. (original) Apparatus according to claim 17, wherein said at least one nozzle includes a nozzle tip which is separable from said at least one nozzle, said gate being located in said nozzle tip.

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33. (currently amended) An injection molding apparatus for forming articles having a hole, comprising:

a mold having a cavity plate and an adjacent core which enclose a mold cavity therebetween;

an injection molding nozzle having a melt channel therethrough, said melt channel communicating with the mold cavity through an annular gate at the tip of the nozzle;

a valve pin disposed ~~interior of~~ within said melt channel, said valve pin and said melt channel defining a melt flow passage around and along the valve pin, said valve pin having a head portion adjacent the nozzle tip and a stem portion remote from the nozzle tip, the head portion having a wider cross-section than the stem portion; and

an actuator operatively linked to the stem portion of said valve pin to move said valve pin between an open position with its head portion adjacent the gate in which molten material can flow through the gate into the mold cavity, and a closed position with its head portion blocking the gate to seal the communication between the nozzle and the mold cavity.

wherein the cross-section of the gate is wider than the cross-section of the melt channel through said nozzle.

34. (canceled)

35. (currently amended) Apparatus according to claim ~~34~~ 33, wherein the head portion of the valve pin has a wider cross-section than the melt channel.

36. (original) Apparatus according to claim 35, wherein the valve pin has a smooth transition portion between its head portion and its stem portion.

37. (currently amended) Apparatus according to claim 36, wherein the head portion of the valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding the valve pin between said open position and said closed position.

38. (original) Apparatus according to claim 37, wherein said gate cross-section is substantially circular.

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39. (original) Apparatus according to claim 37, wherein said gate cross-section is substantially oval.

40. (original) Apparatus according to claim 37, wherein said gate cross-section is substantially square.

41. (original) Apparatus according to claim 37, wherein said gate cross-section is substantially rectangular.

42. (original) Apparatus according to claim 37, wherein said gate cross-section is irregular.

43. (original) Apparatus according to claim 33, wherein the valve pin has a smooth transition portion between its head portion and its stem portion.

44. (currently amended) Apparatus according to claim 43, wherein the head portion of the valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding the valve pin between said open position and said closed position.

45. (original) Apparatus according to claim 35, wherein the peripheral surface of the head portion of the valve pin forms part of the surface of said core when the valve pin is in its closed position to at least partly define and form the hole.

46. (currently amended) Apparatus according to claim 45, wherein the head portion of the valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding the valve pin between said open position and said closed position.

47. (original) Apparatus according to claim 33, wherein the peripheral surface of the head portion of the valve pin forms part of the surface of said core when the valve pin is in its closed position to at least partly define and form the hole.

48. (currently amended) Apparatus according to claim 47, wherein the head portion of the valve pin has a guide portion ~~at its distal end~~ which engages said core for guiding the valve pin between said open position and said closed position.

49. (original) Apparatus according to claim 48, wherein the valve pin has a smooth transition portion between its head portion and its stem portion.

50. (original) Apparatus according to claim 33, including a removable nozzle seal surrounding the head portion of the valve pin, the nozzle seal sealing and guiding the head portion during at least a portion of valve pin movement between said open and closed positions.

51. (currently amended) An injection molding system for forming articles having a hole, comprising:

a mold cavity plate and a plurality of mold cores defining with said mold cavity plate a plurality of mold cavities;

a melt distribution manifold for delivering molten material to said mold cavities;

a plurality of injection molding nozzles respectively associated with said mold cavities, each nozzle having a melt channel therethrough, said melt channel communicating with its respective mold cavity through an annular gate at the tip of the nozzle, and each gate having a wider cross-section than the cross-section of its respective melt channel;

each of said nozzles having a valve pin disposed ~~interior of~~ within said melt channel, said valve pin and said melt channel defining a melt flow passage around and along the valve pin, said valve pin having a head portion adjacent the nozzle tip and a stem portion remote from the nozzle tip, the head portion having a wider cross-section than the stem portion; and

actuating means operatively linked to the stem portion of each of said valve pins to move each valve pin between an open position with its head portion adjacent the gate in which molten material can flow through the gate into the mold cavity, and a closed position with its head portion blocking the gate to seal the communication between the nozzle and the mold cavity.

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52. (original) A system according to claim 51, wherein the actuating means actuates all of the valve pins simultaneously.

53. (original) Apparatus according to claim 51, wherein the peripheral surface of the head portion of each valve pin forms part of the surface of said mold core when the valve pin is in its closed position to at least partly define and form the hole.

54. (currently amended) Apparatus according to claim 53, wherein the head portion of each valve pin has a guide portion ~~at its distal end~~ which engages said mold core for guiding the valve pin between said open position and said closed position.

55. (original) Apparatus according to claim 54, wherein each valve pin has a smooth transition portion between its head portion and its stem portion.

56. (original) Apparatus according to claim 54, including a removable nozzle seal on each nozzle surrounding the head portion of the valve pin, the nozzle seal sealing and guiding

the head portion during at least a portion of valve pin movement between said open and closed positions.

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